Training test

Started on	Sunday, March 15 2020, 4:28 PM
State	finished
Completed on	Sunday, March 15 2020, 5:02 PM
Time taken	33 mins 43 secs
Marks	1550.00 / 1800.00
Grade	**15.50** out of 18.00 (**86** %)

Question 1

correct

Mark 100.00 out of 100.00

The equation $x^4 - 3x^2 - 10 = 0$

- ○ (A) has four distinct real solutions
- ○ (B) has at least two solutions of the same sign
- ○ (C) has no real solutions
- ○ (D) has only negative solutions
- ◉ (E) has two (and only two) distinct real solutions ✓

The correct answer is: it has two (and only two) distinct real solutions

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Question 2

correct

Mark 100.00 out of 100.00

A man has two children, Aldo and Maria. The age of man plus that of Aldo exceeds that of Maria of 80 years. The age of man plus that of Maria exceeds that of Aldo by 90 years. How old is the man?

- ○ (A) 68 years old
- ○ (B) 70 years old
- ○ (C) 54 years old
- ◉ (D) 85 years old ✓
- ○ (E) 45 years old

The correct answer is: 85 years

The data below refer to a questionnaire on the preferences of 30 cyclists:

	in citta'	in campagna
da solo	12	3
in due	9	6

Calculate the percentage of individuals who prefer to ride a bicycle together in the countryside.

○ (A) 90%

○ (B) about 33%

○ (C) 9%

◉ (D) 50% ✗

○ (E) about 67%

The correct answer is: about 67%

A round cylinder C has radius r and height h. The cylinder C' has triple radius and double height compared to C. By indicating with V_C and $V_{C'}$ the respective volumes we can say that

○ (TO) $V_{C'} = 27 V_C$

○ (B) $V_{C'} = 6 V_C$

○ (C) $V_{C'} = 9 V_C$

○ (D) it is impossible to answer without further information

◉ (IS) $V_{C'} = 18 V_C$ ✓

The correct answer is: $V_{C'} = 18 V_C$

Question 5

correct

Mark 100.00 out of 100.00

In a restaurant there are 24 square tables with 4 seats each, which can be arranged individually or combined to form a 6 or 8-seater table. By forming the same number of 4-seater, 6-seater and 8-seater tables, how many seats are obtained?

- ○ (A) 60
- ○ (B) 68
- ○ (C) 84
- ⦿ (D) 72 ✓
- ○ (E) 78

The correct answer is: 72

Question 6

incorrect

Mark -25.00 out of 100.00

Only one of the following statements is correct; identify which one.

- ⦿ (A) Two isosceles triangles with the same vertex angle are always congruent ✗
- ○ (B) Two scalene triangles with the same area are always congruent
- ○ (C) Two right triangles with neatly congruent cathets are always congruent
- ○ (D) Two equiangular triangles are always congruent
- ○ (E) Two equilateral triangles are always congruent

The correct answer is: Two right triangles with neatly congruent cathets are always congruent

Question 7

correct

Mark 100.00 out of 100.00

For $x > 0$, the expression

$$7^{-4 \log_7 x}$$

It's equal to:

- ○ (TO) $7^{-4} + x$
- ○ (B) x^4
- ○ (C) $7x^{-4}$
- ⦿ (D) x^{-4} ✓
- ○ (IS) $7^{-4} x$

The correct answer is: x^{-4}

Question 8

correct

Mark 100.00 out of 100.00

Which of these equations represents a straight line passing through the point $(-1, -3)$ and perpendicular to the bisector of the first quadrant?

○ (TO) $x - 3y - 10 = 0$

○ (B) $2x + y = 0$

◉ (C) $2x + 2y + 8 = 0$ ✓

○ (D) $x - 5y - 2 = 0$

○ (IS) $x + y - 4 = 0$

The correct answer is: $2x + 2y + 8 = 0$

Question 9

correct

Mark 100.00 out of 100.00

A common divisor of monomials $3a^2b^4$, $4a^3b^3x^5$, $a^2b^4x^6$ and '

○ (TO) a^2b^4

○ (B) abx

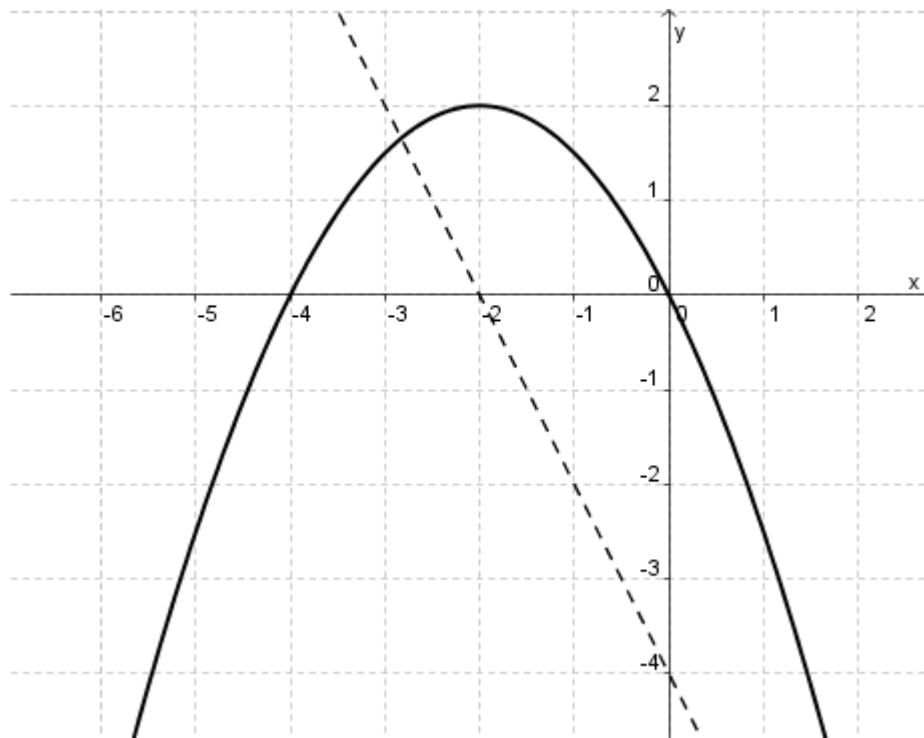○ (C) $a^3b^3x^4$

◉ (D) a^2b^3 ✓

○ (IS) $a^2b^3x^4$

The correct answer is: a^2b^3

The figure shows a straight line and a parabola, which are the graph of the functions

○ (A) $f(x) = -2x - 4, g(x) = -x^2 - 4x$

○ (B) $f(x) = -2x - 2, g(x) = -\frac{1}{2}x(x+4)$

○ (C) $f(x) = -x - 2, g(x) = -x^2 - 4x$

◉ (D) $f(x) = -2x - 4, g(x) = -\frac{1}{2}x(x+4)$ ✓

○ (E) $f(x) = -2x - 4, g(x) = -\frac{1}{2}x^2 + 2x - 1$

The correct answer is: $f(x) = -2x - 4, g(x) = -\frac{1}{2}x(x+4)$

Question 11

correct

Mark 100.00 out of 100.00

Consider the equations

$$A) \quad \frac{x^2 - 3x + 2}{x^3 + 27} = 0 \quad e \quad B) \quad \frac{x^2 - 3x + 2}{x^3 - 27} = 0 \; .$$

Which of the following statements is true?

- ◉ (A) the two equations have the same set of solutions ✓
- ○ (B) the set of solutions of B) is included in the set of solutions of A)
- ○ (C) the set of solutions of A) is included in the set of solutions of B)
- ○ (D) the two equations have only one solution in common
- ○ (E) the two equations have no common solutions

The correct answer is: the two equations have the same set of solutions

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Question 12

correct

Mark 100.00 out of 100.00

The equation $\log_3(x + 2)^2 = 2$

- ○ (A) has no real solutions
- ◉ (B) has the solutions $x = 1$ and $x = -5$ ✓
- ○ (C) has the only solution $x = 1 - \log_3 2$
- ○ (D) has the only solution $x = -5$
- ○ (E) has the only solution $x = 1$

The correct answer is: it has the solutions $x = 1$ and $x = -5$

Question 13

correct

Mark 100.00 out of 100.00

The prime factorization of the number $(5^4 + 5^2)^3 2^4$ is:

- ○ (TO) $2^4 5^6 13^2$
- ○ (B) $2^3 5^4 13^2$
- ○ (C) $2^6 5^4 13$
- ◉ (D) $2^7 5^6 13^3$ ✓
- ○ (IS) $2^7 5^2 13^2$

The correct answer is: $2^7 5^6 13^3$

Simplifying the expression $\left[\left(\dfrac{1}{3}a^3b^2\right)^2 : \left(\dfrac{1}{9}a^2b\right)\right]^3$, where a and b are two non-zero real numbers, we obtain

- ○ (TO) $a^9 b^{12}$
- ◉ (B) $a^{12} b^9$ ✓
- ○ (C) $\dfrac{1}{9}a^{12}b^9$
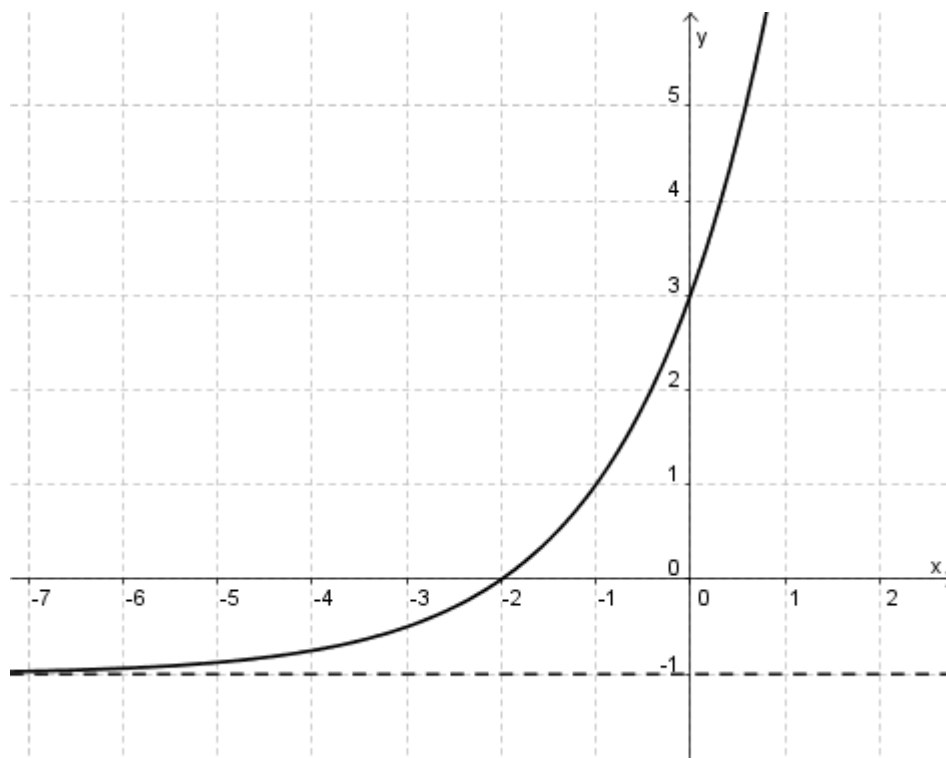- ○ (D) $\dfrac{1}{81}a^9 b^{12}$
- ○ (IS) $9a^{12}b^9$

The correct answer is: $a^{12}b^9$

The figure shows the graph of the function

- ○ (TO) $y = 2^x - 1$
- ○ (B) $y = 4^x - 1$
- ○ (C) $y = 2 \cdot 4^x - 1$
- ○ (D) $y = 2 \cdot 2^x - 1$
- ◉ (IS) $y = 4 \cdot 2^x - 1$ ✓

The correct answer is: $y = 4 \cdot 2^x - 1$

The real number

$$x = \sqrt{2\sqrt[3]{2}\sqrt[3]{\frac{3}{8}}}$$

It's equal to

○ (TO) $\sqrt{2\sqrt[3]{3}}$

⦿ (B) $\sqrt[6]{6}$ ✓

○ (C) $\sqrt[6]{5}$

○ (D) $\sqrt{6}$

○ (IS) $\sqrt[3]{6}$

The correct answer is: $\sqrt[6]{6}$

The expression $2\sin\dfrac{13\pi}{12}\cos\dfrac{13\pi}{12}$ is equal to:

○ (TO) $\sqrt{3}/2$

○ (B) $-1/2$

○ (C) 2

○ (D) $\sin\dfrac{13\pi}{24}$

⦿ (IS) $1/2$ ✓

The correct answer is: $1/2$

Equation circles are given

$$x^2 + y^2 + 2x + 2y + 1 = 0, \qquad x^2 + y^2 + 4x + 2y + 4 = 0.$$

We can say that the two circumferences

- ○ (A) are tangent
- ○ (B) are separated and the second is internal to the first
- ○ (C) intersect at four distinct points
- ⦿ (D) intersect at two distinct points ✔
- ○ (E) are disjointed and the former is internal to the latter

The correct answer is: they intersect in two distinct points